

NEET Exam. 2017 (7th May 2017)

(Paper & Solution)

Code – Y

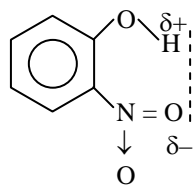
- Q.1** The most suitable method of separation of 1 : 1 mixture of ortho and para-nitrophenols is :
- (1) Steam distillation (2) Sublimation (3) Chromatography (4) Crystallisation

Students may find similar question in CP exercise sheet :

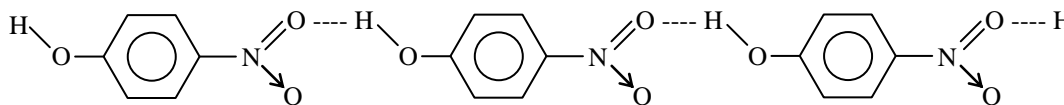
[Chapter : Chemical Bonding, Exercise # 1, Page No.219, Q.110]

Ans. [1]

Sol. In O-nitrophenol intra molecular H-Bond present. So Bpt is low where as in p-nitrophenol molecules are associated by inter molecular H-Bond. So Bpt is high, so o & p-nitrophenol separated by steam distillation method



O – nitrophenol



P-nitrophenol

- Q.2** Which of the following statements is **not** correct?
- (1) Denaturation makes the proteins more active.
(2) Insulin maintains sugar level in the blood of a human body.
(3) Ovalbumin is a simple food reserve in egg-white.
(4) Blood proteins thrombin and fibrinogen are involved in blood clotting.

Students may find similar question in CP exercise sheet :

[Chapter : Biomolecules from Class Notes]

Ans. [1]

Sol. ∴ Denaturation makes the protein inactive.

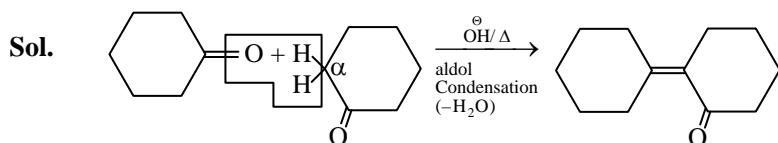
Q.3 Of the following, which is the product formed when cyclohexanone undergoes aldol condensation followed by heating?



Students may find similar question in CP exercise sheet :

[Chapter : Oxygen containing compounds from Class Notes]

Ans. [3]



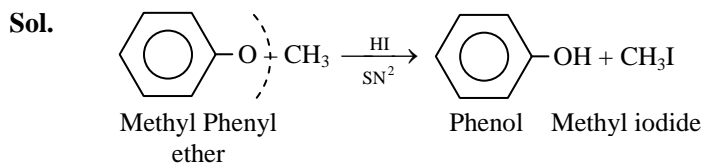
Q.4 The heating of phenyl-methyl ethers with HI produces.

- (1) benzene (2) ethyl chlorides (3) iodobenzene (4) phenol

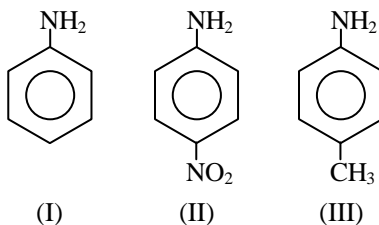
Students may find similar question in CP exercise sheet :

[Chapter : Oxygen compounds from Class Notes]

Ans. [4]



Q.5 The **correct** increasing order of basic strength for the following compounds is :



- (1) II < I < III (2) II < III < I (3) III < I < II (4) III < II < I

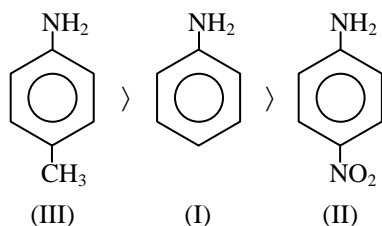
Students may find similar question in CP exercise sheet :

[Chapter : GOC-II, Exercise # 1, Page No.110, Q.68]

Ans. [1]

Sol. \therefore Basic strength $\propto \frac{+M, +H, +I}{-M, -H, -I}$

\therefore Answer will be :



Q.6 Which one of the following pairs of species have the same bond order?

- (1) N_2 , O_2^- (2) CO, NO (3) O_2 , NO^+ (4) CN^- , CO

Students may find similar question in CP exercise sheet :

[Chapter : Chemical Bonding, Exercise # 3(A), Page No.235, Q.116]

Ans. [4]

Sol. CO & CN^- are isoelectronic and having same bond order 3

Q.7 Name the gas that can readily decolourise acidified $KMnO_4$ solution :

- (1) P_2O_5 (2) CO_2 (3) SO_2 (4) NO_2

Students may find similar question in CP exercise sheet :

[Chapter : Oxidation Reduction, Exercise # 1, Page No.90, Q.70]

Ans. [3]

Sol. $KMnO_4 + SO_2 + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + H_2O$

\therefore SO_2 which is R.A. decolourize $KMnO_4$

Q.8 The reason for greater range of oxidation states in actinoids is attributed to :

- (1) 4f and 5d levels being close in energies
(2) the radioactive nature of actinoids
(3) actinoid contraction
(4) 5f, 6d and 7s levels having comparable energies

Students may find similar question in CP exercise sheet :

[Chapter : Periodic table, Exercise # 3(A), Page No.188, Q.33]

Ans. [4]

Sol. Actinoid shows greater range of oxidation state because 5f, 6d, 7s levels having comparable energies.

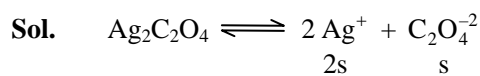
Q.9 Concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is $2.2 \times 10^{-4} \text{ mol L}^{-1}$. Solubility product of $Ag_2C_2O_4$ is :

- (1) 5.3×10^{-12} (2) 2.42×10^{-8} (3) 2.66×10^{-12} (4) 4.5×10^{-11}

Students may find similar question in CP exercise sheet :

[Chapter : Ionic equilibrium, Exercise # 1-A, Page No.142, Q.59]

Ans. [1]



$$2s = 2.2 \times 10^{-4}$$

$$s = 1.1 \times 10^{-4}$$

$$K_{sp} = 4s^3 = 4 \times (1.1 \times 10^{-4})^3$$

$$= 4 \times (1.1)^3 \times 10^{-12}$$

$$= 5.324 \times 10^{-12} \text{ M}^3$$

Q.10 With respect to the conformers of ethane, which of the following statements is **true**?

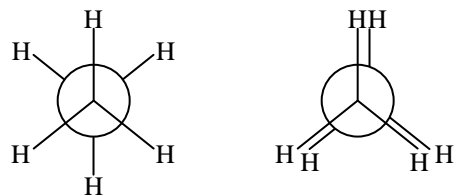
- (1) Both bond angles and bond length remains same
- (2) Bond angle remains same but bond length changes
- (3) Bond angle changes but bond length remains same
- (4) Both bond angle and bond length change

Students may find similar question in CP exercise sheet :

[Chapter : Isomerism (GOC-I) from Class Notes]

Ans. [1]

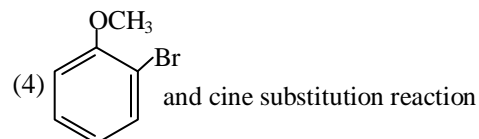
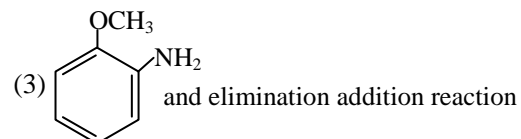
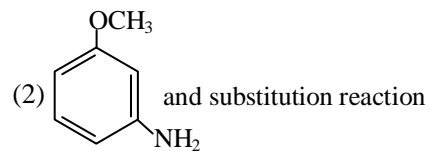
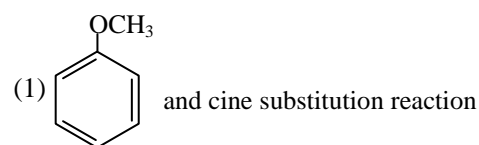
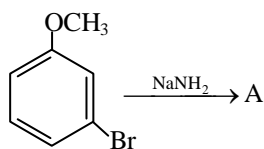
Sol.



Bond angle \Rightarrow Unchanged

Bond length \Rightarrow Unchanged

Q.11 Identify A and predict the type of reaction

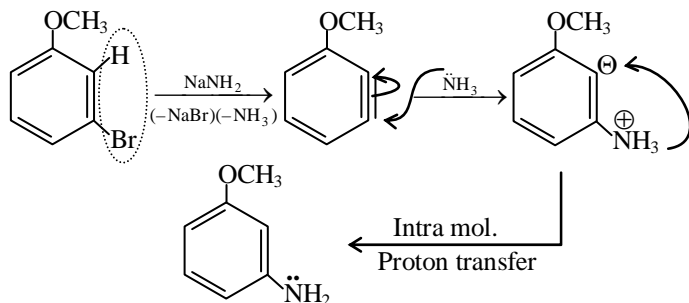


Students may find similar question in CP exercise sheet :

[Chapter : Halogen Compounds, Exercise # 2, Page No.18, Q.9]

Ans. [2]

Sol.



Overall Br is replaced by NH₂ group so we can say substitution reaction.

Q.12 Which of the following is sink for CO?

- (1) Plants (2) Haemoglobin
(3) Micro organisms present in the soil (4) Oceans

Students may find similar question in CP exercise sheet :

[Chapter : Environmental Chemistry, Exercise # 2, Page No.243, Q.20]

Ans. [3]

Sol. Soil is a natural sink for carbon monoxide. The soil's ability to remove carbon monoxide from the atmosphere is due to the activity of soil micro-organisms.

Q.13 In which pair of ions both the species contain S – S bond?

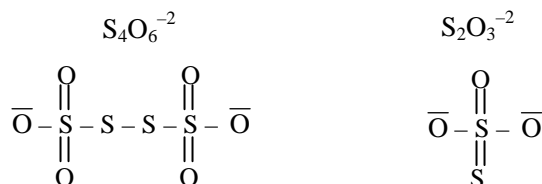
- (1) S₄O₆²⁻, S₂O₇²⁻ (2) S₂O₇²⁻, S₂O₃²⁻ (3) S₄O₆²⁻, S₂O₃²⁻ (4) S₂O₇²⁻, S₂O₈²⁻

Students may find similar question in CP sheet :

[Chapter : p-block from Class Notes]

Ans. [3]

Sol. (i)



Q.14 Pick out the correct statement with respect to [Mn(CN)₆]³⁻ :

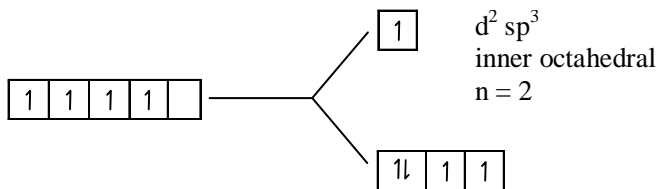
- (1) It is dsp² hybridised and square planar
(2) It is sp³d² hybridised and octahedral
(3) It is sp³d² hybridised and tetrahedral
(4) It is d²sp³ hybridised and octahedral

Students may find similar question in CP sheet :

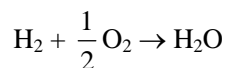
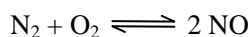
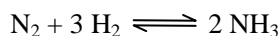
[Chapter : Coordination compounds from Class Notes]

Ans. [4]

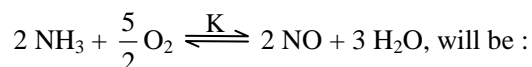
Sol. $[\text{Mn}(\text{CN})_6]^{-3}$
 ${}_{25}\text{Mn} = [\text{Ar}] 3d^5 4s^2$
 $\text{Mn}^{+3} = [\text{Ar}] 3d^4$
 CN^- is strong ligand
 $\therefore \Delta_0$ is high complex is $d^2 sp^3$ hybridised and inner octahedral



Q.15 The equilibrium constants of the following are :



The equilibrium constant (K) of the reaction :



(1) $K_2^3 K_3/K_1$

(2) $K_1 K_3^3/K_2$

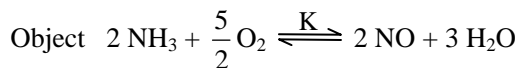
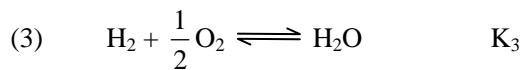
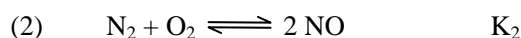
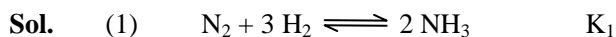
(3) $K_2 K_3^3/K_1$

(4) $K_2 K_3/K_1$

Students may find similar question in CP exercise sheet :

[Chapter : Chemical Equilibrium, Exercise # 3-A, Page No121, Q.18]

Ans. [3]



Equation (3) $\times 3 + (2) - (1)$

$$\therefore K = \frac{K_2 \times K_3^3}{K_1}$$

Q.16 Match the interhalogen compounds of **column I** with the geometry in **column II** and assign the correct code.

Column I	Column II
(a) XX'	(i) T - shape
(b) XX'_3	(ii) Pentagonal bipyramidal
(c) XX'_5	(iii) Linear
(d) XX'_7	(iv) Square – pyramidal
	(v) Tetrahedral

Code :

	(a)	(b)	(c)	(d)
(1)	(iv)	(iii)	(ii)	(i)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(iii)	(i)	(iv)	(ii)
(4)	(v)	(iv)	(iii)	(ii)

Students may find similar question in CP exercise sheet :

[Chapter : p-block from Class Notes]

Ans. [3]

- Sol.** (a) XX^1 sp^3 Linear
(b) XX_3^1 sp^3d T-shape
(c) XX_5^1 sp^3d^2 square pyramid
(d) XX_7^1 sp^3d^3 Penta genal planar

a \Rightarrow iiib \Rightarrow (i)c \Rightarrow (iv)d \Rightarrow (ii)**Q.17** Mixture of chloroxylenol and terpineol acts as :

- (1) antibiotic (2) analgesic (3) antiseptic (4) antipyretic

Students may find similar question in CP exercise sheet :

[Chapter : Chemistry in everyday life, Exercise # 3, Page No.214, Q.25]

Ans. [3]**Sol.** Mixture of Chloroxylenol and terpineol is called dettol which acts as an antiseptic.**Q.18** It is because of inability of ns^2 electrons of the valence shell to participate in bonding that :

- (1)
- Sn^{4+}
- is reducing while
- Pb^{4+}
- is oxidising
-
- (2)
- Sn^{2+}
- is reducing while
- Pb^{4+}
- is oxidising
-
- (3)
- Sn^{2+}
- is oxidising while
- Pb^{4+}
- is reducing
-
- (4)
- Sn^{2+}
- and
- Pb^{2+}
- are both oxidising and reducing

Students may find similar question in CP exercise sheet :

[Chapter : Electro Chemistry, Exercise # 3(A), Page No.30, Q.21]

Ans. [2]**Sol.** Due to inert pair effect Pb^{+2} is more stable where as in tin Sn^{+4} is more stable. \therefore Pb^{+4} will get reduce and Sn^{+2} will get Oxidize.[Pb^{+4} = oxidising agent, Sn^{+2} = reducing agent]

- Q.22** Which of the following is dependent on temperature ?
(1) Weight percentage (2) Molality (3) Molarity (4) Mole fraction

Students may find similar question in CP exercise sheet :

[Chapter : Solution colligative properties, Exercise # 1, Page No.49, Q.33]

Ans. [3]

Sol. Molarity depends upon temperature

$$M = \frac{W_A \times 1000}{M_A \times V}$$

$$V \propto T$$

$T \uparrow, V \uparrow$, Molarity (\downarrow)

- Q.23** The correct order of the stoichiometries of AgCl formed when AgNO₃ in excess is treated with the complexes :
CoCl₃.6NH₃, CoCl₃.5NH₃, CoCl₃.4NH₃ respectively is -

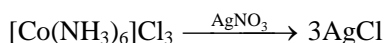
- (1) 2AgCl, 3AgCl, 1AgCl (2) 1AgCl, 3AgCl, 2AgCl
(3) 3AgCl, 1AgCl, 2AgCl (4) 3AgCl, 2AgCl, 1AgCl

Students may find similar question in CP exercise sheet :

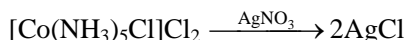
[Chapter : Coordination compounds, Exercise # 11(B), Page No.77, Q.113]

Ans. [4]

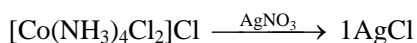
Sol. CoCl₃.6NH₃



CoCl₃.5NH₃



CoCl₃.4NH₃



- Q.24** An example of a sigma bonded organometallic compound is -
(1) Cobaltocene (2) Ruthenocene (3) Grignard's reagent (4) Ferrocene

Students may find similar question in CP exercise sheet :

[Chapter : Coordination compounds, Exercise # 7, Page No.56, Q.3]

Ans. [3]

Sol. Grignard's reagent (R mg x) is σ -bonded organometallic compound CH₃-Mg-I

Ferrocene, cobaltocene and Ruthenocene are π -bonded organometallic compound and they contain cyclopentadienyl ring

Q.25 Which one is the wrong statement ?

- (1) The energy of 2s orbital is less than the energy of 2p orbital in case of Hydrogen like atoms
- (2) de-Broglie's wavelength is given by $\lambda = \frac{h}{mv}$ where m = mass of the particle, v = group velocity of the particle.
- (3) The uncertainty principle is $\Delta E \times \Delta t \geq \frac{h}{4\pi}$
- (4) Half filled and fully filled orbitals have greater stability due to greater exchange energy, greater symmetry and more balanced arrangement

Students may find similar question in CP exercise sheet :

[Chapter : Atomic Structure, Exercise # 1, Page No.21, Q.28]

Ans. [1]

Sol. In hydrogen like atom energy 2s is equal to 2p (as in single electron species)

Q.26 Which one is the most acidic compound ?

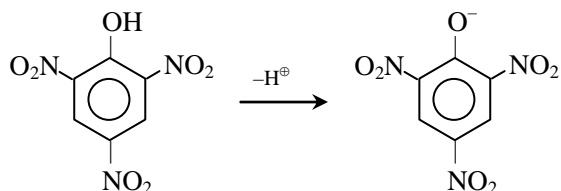


Students may find similar question in CP exercise sheet :

[Chapter : GOC-II, Exercise # 2, Page No.115, Q.23]

Ans. [1]

Sol. \therefore Acidic strength \propto stability of anion



Max. stable anion due to delocalised \ominus ve charge & $-\text{M}$ effect of all three NO_2 group

Q.27 A first order reaction has a specific reaction rate of 10^{-2}sec^{-1} . How much time will it take for 20 g of the reactant to reduce to 5g ?

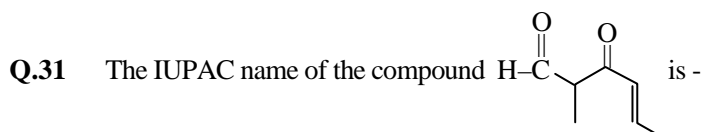
- (1) 693.0 sec (2) 238.6 sec (3) 138.6 sec (4) 346.5 sec

Students may find similar question in CP exercise sheet :

[Chapter : Chemical Kinetics, Exercise # 3A, Page No.201, Q.36]

Ans. [3]

Sol. For first order reaction

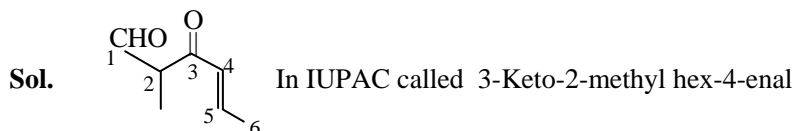


- (1) 3-keto-2-methylhex-5-enal (2) 3-keto-2-methylhex-4-enal
 (3) 5-formylhex-2-en-3-one (4) 5-methyl-4-oxohex-2-en-5-al

Students may find similar question in CP exercise sheet :

[Chapter : Nomenclature (GOC-I) From Class Notes]

Ans. [2]



Q.32 In the electrochemical cell –
 $\text{Zn}|\text{ZnSO}_4(0.01\text{M})||\text{CuSO}_4(1.0\text{M})|\text{Cu}$, the emf of this Daniel cell is E_1 . When the concentration of ZnSO_4 is changed to 1.0 M and that of CuSO_4 changed to 0.01M, the emf changes to E_2 . From the followings, which one is the relationship between E_1 and E_2 ? (Given, $\frac{RT}{F} = 0.059$).

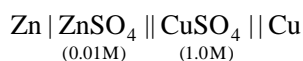
- (1) $E_2 = 0 \neq E_1$ (2) $E_1 = E_2$ (3) $E_1 < E_2$ (4) $E_1 > E_2$

Students may find similar question in CP exercise sheet :

[Chapter : Electrochemistry, Exercise # 3A, Page No.31, Q.31]

Ans. [4]

Sol.



Nernst equation

$$\text{Emf} = E_{\text{cell}}^{\circ} - \frac{0.059}{2} \log \frac{[\text{Zn}^{+2}]}{[\text{Cu}^{+2}]}$$

In first case

$$E_1 = E_{\text{cell}}^{\circ} - \frac{0.059}{2} \log \frac{0.01}{1}$$

In second case

$$E_2 = E_{\text{cell}}^{\circ} - \frac{0.059}{2} \log \frac{1}{0.01}$$

So $E_1 > E_2$

Sol. Electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile.

Q.36 For a given reaction, $\Delta H = 35.5 \text{ kJ mol}^{-1}$ and $\Delta S = 83.6 \text{ JK}^{-1} \text{ mol}^{-1}$. The reaction is spontaneous at : (Assume that ΔH and ΔS do not vary with temperature)

(1) $T > 298 \text{ K}$

(2) $T < 425 \text{ K}$

(3) $T > 425 \text{ K}$

(4) All temperatures

Students may find similar question in CP exercise sheet :

[Chapter : Chemical Thermodynamics & Energetic, Exercise # 3(A), Page No.157, Q.66]

Ans. [3]

Sol. $\Delta G = \Delta H - T\Delta S$

at equilibrium $\Delta G = 0$

$$35.5 \times 10^3 - T \times 83.6 = 0$$

$$T_{\text{eq}} = \frac{35.5 \times 10^3}{83.6} = 424.64$$

If $T > T_{\text{eq}}$; $\Delta G = -ve$

$\therefore T > 425 \text{ K}$

Q.37 Which of the following pairs of compounds is isoelectronic and isostructural ?

(1) $\text{IF}_3, \text{XeF}_2$

(2) $\text{BeCl}_2, \text{XeF}_2$

(3) $\text{TeI}_2, \text{XeF}_2$

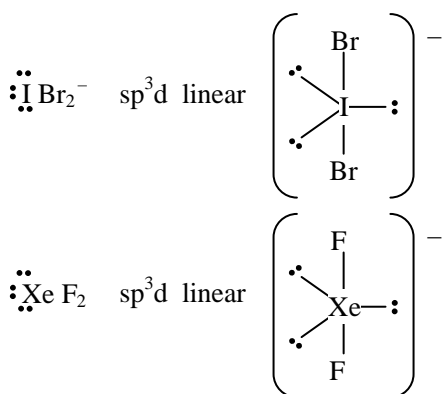
(4) $\text{IBr}_2, \text{XeF}_2$

Students may find similar question in CP exercise sheet :

[Chapter : Chemical Bonding, Exercise # 3(A), Page No.228, Q.81]

Ans. [4]

Sol. IBr_2^- and XeF_2 are isoelectronic because they contain same number of valence electron and both are linear.



Q.42 Which one is the correct order of acidity ?

- (1) $\text{CH}_3 - \text{CH}_3 > \text{CH}_2 = \text{CH}_2 > \text{CH}_3 - \text{C} \equiv \text{CH} > \text{CH} \equiv \text{CH}$
- (2) $\text{CH}_2 = \text{CH}_2 > \text{CH}_3 - \text{CH} = \text{CH}_2 > \text{CH}_3 - \text{C} \equiv \text{CH} > \text{CH} \equiv \text{CH}$
- (3) $\text{CH} \equiv \text{CH} > \text{CH}_3 - \text{C} \equiv \text{CH} > \text{CH}_2 = \text{CH}_2 > \text{CH}_3 - \text{CH}_3$
- (4) $\text{CH} \equiv \text{CH} > \text{CH}_2 = \text{CH}_2 > \text{CH}_3 - \text{C} \equiv \text{CH} > \text{CH}_3 - \text{CH}_3$

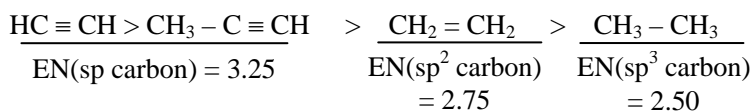
Students may find similar question in CP exercise sheet :

[Chapter : Hydrocarbons, Exercise # 3, Page No.165, Q.3]

Ans. [3]

Sol. Acidic nature $\propto \frac{-I}{+I} \propto \text{E. N.}$

\therefore Acidic strength order will be



Q.43 If molality of the dilute solution is doubled, the value of molal depression constant (K_f) will be

- (1) unchanged
- (2) doubled
- (3) halved
- (4) tripled

Students may find similar question in CP exercise sheet :

[Chapter : Solution Colligative Properties , Page No.59, Table No. 4]

Ans. [1]

Sol. $\Delta T_f = K_f \times m$

$K_f \rightarrow$ does not depend on molality

So, K_f molal depression constant remains same

Q.44 The species, having bond angles of 120° is

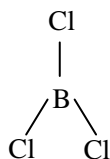
- (1) BCl_3
- (2) PH_3
- (3) ClF_3
- (4) NCl_3

Students may find similar question in CP exercise sheet :

[Chapter : Chemical Bonding, Exercise # 3(A), Page No.226, Q.34]

Ans. [1]

Sol. BCl_3 is sp^2 hybridized so, BCl_3 is trigonal planar and Bond angle is 120°



Q.45 Which of the following reactions is appropriate for converting acetamide to methanamine ?

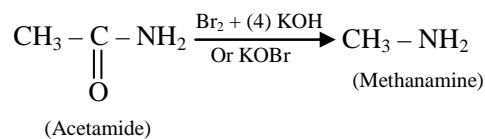
- (1) Gabriels phthalimide synthesis (2) Carbylamine reaction
(3) Hoffmann hypobromamide reaction (4) Stephens reaction

Students may find similar question in CP sheet :

[Chapter :Nitrogen compounds from Class Notes]

Ans. [3]

Sol.



It is called Hoffmann's hypobromamide reaction.

Kota's Top Most **Pre-Medical Faculty** Team with **Highest Success Rate**

PHYSICS TEAM



Dinesh Jain
Exp: 18 years



Govind Sharma
Exp: 18 years



Praveen Mehendiratta
Exp: 17 years



Dinesh Jangid
Exp: 17 years



Arun Kr. Pathak
Exp: 16 Years



Sandeep Gupta
Exp: 16 years



Martand Gaur
Exp: 15 years



Suresh Singh
Exp: 14 Years



Deepraj Chouhan
Exp: 5 years



Sudhir Mishra
Exp: 5 years



Arun Menaria
Exp: 3 years

CHEMISTRY TEAM



Pankaj Talwar
Exp: 21 years



Ramesh Sharda
Exp: 19 years



Pradeep Chittora
Exp: 15 years



Dr. Mohd. Arif
Exp: 14 years



Vivas Mittal
Exp: 8 Years



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Nitin Dadhich
Exp: 16 years



C. Mauli Maurya
Exp: 15 years



Dr. Mohd Salim
Exp: 15 years



Pramod Arya
Exp: 13 years



Dr. Rakesh Verma
Exp: 7 years



Brijesh Dubey
Exp: 7 years



Mohd Irshad
Exp: 7 years

Majority of Top Rankers from Kota have been produced by members of this team

- Q.46** Asymptote in a logistic growth curve is obtained when :
- (1) $K < N$ (2) The value of 'r' approaches zero
(3) $K = N$ (4) $K > N$

Students may find similar question in CP exercise sheet :

[Chapter : Ecology : Population & Community, Theory, Page No.51]

Ans. [3]

Sol. $K = N$

When K (Carrying capacity) equals to N (Population Density) the logistic growth acquire steady or asymptote stage

- Q.47** The vascular cambium normally gives rise to :
- (1) Periderm (2) Phelloderm
(3) Primary phloem (4) Secondary xylem

Students may find similar question in CP exercise sheet : Structural organization in plants

Exercise # 2, Page No.61, Q.61]

Ans. [4]

Sol. The vascular cambium normally gives rise to secondary xylem

- Q.48** In case of poriferans, the spongocoel is lined with flagellated cells called :
- (1) Mesenchymal cells (2) Ostia
(3) Oscula (4) Choanocytes

Students may find this in CP sheet : Animal Diversity, Page 15

Ans. [4]

Sol. Choanocyte or Collar cell are flagellated cell and lines Spongocoel and canal both.

- Q.49** Fruit and leaf drop at early stages can be prevented by the application of
- (1) Gibberellic acid (2) Cytokinins (3) Ethylene (4) Auxins

Students may find similar question in CP exercise sheet :

[Chapter : Plant Physiology : Plant growth & Hormones, Theory, Page No.144]

Ans. [4]

Sol. Auxin prevents abscission of young plant parts

- Q.50** A gene whose expression helps to identify transformed cell is known as
- (1) Structural gene (2) Selectable marker
(3) Vector (4) Plasmid

Students may find this in CP sheet : Biotechnology, Page No.96

Ans. [2]

Q.51 The final proof for DNA as the genetic material came from the experiments of

- (1) Hargobind Khorana
- (2) Griffith
- (3) Hershey and chase
- (4) Avery, Mcleod and McCarty

Students may find this in CP sheet :Protoplasm,Page No.135

Ans. [3]

Sol. Hershey and Chase gave the final unequivocal proof for DNA as the genetic material.

Q.52 With reference to factors affecting the rate of photosynthesis, which of the following statements is **not correct** ?

- (1) Tomato is a greenhouse crop which can be grown in CO₂-enriched atmosphere for higher yield
- (2) Light saturation for CO₂ fixation occurs at 10% of full sunlight
- (3) Increasing atmospheric CO₂ concentration up to 0.05% can enhance CO₂ fixation rate
- (4) C₃ plants respond to higher temperatures with enhanced photosynthesis while C₄ plants have much lower temperature optimum

Students may find similar question in CP exercise sheet :

[Chapter :Plant Physiology : Photosynthesis, Theory, Page No.21]

Ans. [4]

Sol. C₃ plants are adapted to cold climate while C₄ plants are adapted to hot & dry climate

Q.53 The association of histone H1 with a nucleosome indicates :

- (1) The DNA double helix is exposed
- (2) Transcription is occurring
- (3) DNA replication is occurring
- (4) The DNA is condensed into a Chromatin Fibre

Students may find this in CP sheet :Protoplasm

Ans. [4]

Sol. During DNA condensation into a chromatin fibre the DNA wraps around histone octamer and H1 Histone works as clip to prevent unwrapping of DNA

Q.54 GnRH, a hypothalamic hormone, needed in reproduction, acts on

- (1) Posterior pituitary gland and stimulates secretion of LH and relaxin
- (2) Anterior pituitary gland and stimulates secretion of LH and oxytocin
- (3) Anterior pituitary gland and stimulates secretion of LH and FSH
- (4) Posterior pituitary gland and stimulates secretion of oxytocin and FSH

Ans. [3]

Sol. GnRH gonadotropic releasing hormone is released by hypothalamus and acts on anterior pituitary (adenohypophysis) and stimulates release of gonadotropins (FSH & LH)



- Q.55** DNA fragments are
- (1) Either positively or negatively charged depending on their size
 - (2) Positively charged
 - (3) Negatively charged
 - (4) Neutral

Students may find similar question in CP exercise sheet : Genetic, Page No.42

Ans. [3]

Sol. DNA fragments are negatively charged due to phosphate ($H_3PO_4^-$) backbone

- Q.56** Which of the following options gives the **correct sequences** of events during mitosis ?
- (1) condensation → arrangement at equator → centromere division → segregation → telophase
 - (2) condensation → nuclear membrane disassembly → crossing over → segregation → telophase
 - (3) condensation → nuclear membrane disassembly → arrangement at equator → centromere division → segregation → telophase
 - (4) condensation → crossing over → nuclear membrane disassembly → segregation → telophase

*Students may find similar question in CP exercise sheet : Cell Structure and Function
Exercise # 2, Page No.88, Q.171*

Ans. [3]

Sol. The correct sequence reduce of events during mitosis is
condensation → nuclear membrane disassembly → arrangement at equator → centromere division → segregation → telophase

- Q.57** Lungs are made up of air-filled sacs, the alveoli. They do not collapse even after forceful expiration, because of :
- (1) Expiratory Reserve Volume
 - (2) Residual Volume
 - (3) Inspiratory Reserve Volume
 - (4) Tidal Volume

Students may find this in CP sheet : Animal Physiology, Page No.149

Ans. [2]

Sol. 1200 ml residual volume always stays inside lungs

- Q.58** Which one of the following statements is **correct** with reference to enzymes ?
- (1) Holoenzyme = Coenzyme + Co-factor
 - (2) Apoenzyme = Holoenzyme + Coenzymes
 - (3) Holoenzyme = Apoenzyme + Coenzyme
 - (4) Coenzyme = Apoenzyme + Holoenzyme

*Students may find similar question in CP exercise sheet :
[Chapter : Plant Physiology : Enzyme, Theory, Page No.119]*

Ans. [3]

Sol. Holoenzyme formed by binding of Apoenzyme (protein part) with non-protein part (coenzyme)



Q.59 Which of the following are **not** polymeric ?

- (1) Lipids
- (2) Nucleic acids
- (3) Proteins
- (4) Polysaccharides

Students may find this in CP sheet :Protoplasm, Page No.108

Ans. [1]

Sol. Lipids are strictly not macromolecules they are not polymeric and have molecular weight less than 800 Da

Q.60 Which of the following components provides sticky character to the bacterial cells ?

- (1) Glycocalyx
- (2) Cell wall
- (3) Nuclear membrane
- (4) Plasma membrane

Students may find this in CP sheet :Plant Diversity, Page No.25

Ans. [1]

Sol. Glycocalyx is the outer most part of bacterial envelope which is either composed of slimy layer (Dextrin sugar) or capsule form

Q.61 An example of colonial alga is :

- (1) *Spirogyra*
- (2) *Chlorella*
- (3) *Volvox*
- (4) *Ulothrix*

Students may find this in CP sheet :Plant Diversity, Page No.99

Ans. [3]

Sol. Volvox forms colony which rolls over water – colony of volvox is termed coenobium.

Q.62 A dioecious flowering plant prevents both :

- (1) Cleistogamy and xenogamy
- (2) Autogamy and xenogamy
- (3) Autogamy and geitonogamy
- (4) Geitonogamy and xenogamy

Ans. [3]

Sol. Dioecious flowering plant means sex organs are present on separate plants which will prevent both autogamy (within same flower and geitonogamy (between two different flower of same plant)

Q.63 Plants which produce characteristic pneumatophores and show vivipary belong to :

- (1) Hydrophytes
- (2) Mesophytes
- (3) Halophytes
- (4) Psammophytes

Students may find similar question in CP exercise sheet : Ecology

Chapter: Organism & Environment, Theory, Page No.30]

Ans. [3]

Sol. Halophytes grows in saline conditions so show pneumatophores of vivipary

- Q.64** Coconut fruit is
(1) Capsule (2) Drupe (3) Berry (4) Nut

*Students may find similar question in CP exercise sheet : Structural Organisation in Plants
Exercise # 2, Page No.125, Q.49, 61]*

Ans. [2]

Sol. Coconut is a drupe fruit

- Q.65** Which of the following is made up of dead cells ?

- (1) Phloem (2) Xylem parenchyma
(3) Collenchyma (4) Phellem

*Students may find similar question in CP exercise sheet : Structural Organisation in Plants
Exercise # 1, Page No.54, Q.166, Exercise # 2, Page No.68, Q.181]*

Ans. [4]

Sol. Phellem is made up of dead cells

- Q.66** Root hairs develop from the region of :

- (1) Meristematic activity (2) Maturation
(3) Elongation (4) Root cap

*Students may find similar question in CP exercise sheet : Structural Organisation in Plants
Exercise # 2, Page No.83 (diagram)]*

Ans. [2]

Sol. Root hair develop from region of maturation

- Q.67** Which of the following options best represents the enzyme composition of pancreatic juice ?

- (1) Lipase, amylase, trypsinogen, procarboxypeptidase
(2) Amylase, peptidase, trypsinogen, rennin
(3) Amylase, pepsin, trypsinogen, maltase
(4) Peptidase, amylase, pepsin, rennin

Ans. [1]

Sol. Pancreas produces pancreatic juice which is released in duodenum along with bile juice & contains enzymes as such lipase, amylase trypsinogen & procarboxypeptidase.

- Q.68** Zygotic meiosis is characteristic of :

- (1) *Chlamydomonas* (2) *Marchentia* (3) *Fucus* (4) *Funaria*

Students may find this in CP sheet :Plant Diversity, Page No.102

Ans. [1]

Sol. Zygotic meiosis – Haplontic life cycle eg. *Chlamydomonas*
Marchantia → Haplo-diplontic → Sporic meiosis
Fucus → Diplontic → Sporic meiosis
Funaria → Haplo-diplontic → Sporic meiosis

- Q.69** Which of the following are found in extreme saline conditions ?
(1) Mycobacteria (2) Archaeobacteria (3) Eubacteria (4) Cyanobacteria

Students may find this in CP sheet :Plant Diversity, Page No.24

Ans. [2]

Sol. Halophiles form of Archeobacteria are found in extreme saline conditions

- Q.70** In Bougainvillea thorns are the modifications of :
(1) Leaf (2) Stipules (3) Adventitious root (4) Stem

Students may find similar question in CP exercise sheet : Structural Organisation in Plants Theory, Page No.87]

Ans. [4]

Sol. In bougainvillea the thorns are modifications of stem

- Q.71** Viroids differ from viruses in having
(1) RNA molecules without protein coat
(2) DNA molecules with protein coat
(3) DNA molecules without protein coat
(4) RNA molecules with protein coat

Students may find this in CP sheet :Plant Diversity, Page No.189

Ans. [1]

Sol. Viroids have only low molecular weight RNA without protein coat

- Q.72** Adult human RBCs are enucleate. Which of the following statements(s) is / are **most appropriate** explanation for this feature ?
(a) They do not need to reproduce
(b) They are somatic cells
(c) They do not metabolize
(d) All their internal space is available for oxygen transport

Options :

- (1) (b) and (c)
(2) Only (d)
(3) Only (a)
(4) (a), (c) and (d)

Students may find similar question in CP exercise sheet : Animal Physiology-I Page No.32

Ans. [2]

Sol. Adult human RBCs are enucleated, this helps in increased availability of space for haemoglobin. This feature is beneficial for carrying more oxygen.

Q.73 Which of the following RNAs should be most abundant in animal cell ?

- (1) mi-RNA
- (2) r-RNA
- (3) t-RNA
- (4) m-RNA

Students may find this in CP sheet :Protoplasm,Page No.121

Ans. [2]

Sol. rRNA – approx 80% of cellular RNA

Q.74 During DNA replication, Okazaki fragments are used to elongate.

- (1) The lagging strand away from the replication fork
- (2) The leading strand towards replication fork
- (3) The lagging strand towards replication fork
- (4) The leading strand away from replication

Students may find this in CP sheet :Protoplasm, Page No.125

Ans. [1]

Sol. In replication fork, leading and lagging strand are away from each other, Okazaki fragments are present on lagging strand.

Q.75 Select the **correct** route for the passage of sperms in male frogs :

- (1) Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca
- (2) Testes → Bidder's canal → Kidney → Vasa efferentia → Urinogenital duct → Cloaca
- (3) Testes → Vasa efferentia → Kidney → Seminal vesicle → Urinogenital duct → Cloaca
- (4) Testes → Vasa efferentia → Bidder's canal → Ureter → Cloaca

Students may find this in CP sheet : Lower Animal, Page No.177

Ans. [1]

Sol. From testes of frog 10-12 Vasa efferentia comes out enters into kidney and open into Bidder's canal which leads into ureter (Urinogenital duct).& then into Cloaca.

Ureter = Urinogenital duct in male frog

Q.76 If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered ?

- (1) 333
- (2) 1
- (3) 11
- (4) 33

Students may find this in CP sheet :Protoplasm, Page No.132

Ans. [4]

Sol. 333 amino acid from 999 bases

300 amino acid from 900 bases

Alteration in 901 means frame shift occurred in the sequence thereafter, which will affect rest 33 codons.

- Q.77** Which of the following facilitates opening of stomatal aperture ?
- (1) Longitudinal orientation of cellulose microfibrils in the cell wall of guard cells
 - (2) Contraction of outer wall of guard cells
 - (3) Decrease in turgidity of guard cells
 - (4) Radial orientation of cellulose microfibrils in the cell wall of guard cells

Students may find similar question in CP exercise sheet : Plant Physiology
[Chapter : Plant Water Relation, Page No.202,]

Ans. [4]

Sol. Radial arrangement of cellulose microfibrils is present on inner wall of guards cell

- Q.78** Anaphase Promoting Complex (APC) is protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, which of the following is expected to occur ?
- (1) Recombination of chromosome arms will occur
 - (2) Chromosomes will not condense
 - (3) Chromosomes will be fragmented
 - (4) Chromosomes will not segregate

Students may find this in CP sheet

Ans. [4]

Sol. Separase enzyme is a part of APC (Anaphase promoting complex) that degrades cohesion protein, separating the two chromatids. If APC is defective, the chromatids will not separate.

- Q.79** Life cycle of Ectocarpus and Fucus **respectively** are :
- (1) Haplodiplontic, Haplontic
 - (2) Haplontic, Diplontic
 - (3) Diplontic, Haplodiplontic
 - (4) Haplodiplontic, Diplontic

Students may find this in CP sheet :Plant Diversity, Page No.102

Ans. [4]

Sol. Ectocarpus – Haplodiplontic (Iso morphic type)
Fucus – Diplontic life cycle.

- Q.80** Which statements is **wrong** for Krebs' cycle?
- (1) The cycle starts with condensation of acetyl group (acetylCoA) with pyruvic acid to yield citric acid.
 - (2) There are three points in the cycle where NAD^+ is reduced to $\text{NADH} + \text{H}^+$
 - (3) There is one point in the cycle where FAD^+ is reduced to FADH_2
 - (4) During conversion of succinyl CoA to succinic acid, a molecule of GTP is synthesised

Students may find similar question in CP exercise sheet :Plant physiology
[Chapter : Cell Rejiration, Theory Page No.72,

Ans. [1]

Sol. Krebs' cycle starts with condensation of Acetyl CoA with Oxaloacetic acid.

Q.81 Transplantation of tissues/ organs fails often due to non-acceptance by the patient's body. Which type of immune-response is responsible for such rejections?

- (1) Physiological immune response
- (2) Autoimmune response
- (3) Cell-mediated immune response
- (4) Hormonal immune response

Students may find similar question in CP exercise sheet : Immunity and Disease

[Page No.110]

Ans. [3]

Q.82 Artificial selection to obtain cows yielding higher milk output represents :

- (1) stabilizing followed by disruptive as it stabilizes the population to produce higher yielding cows.
- (2) stabilizing selection as it stabilizes this character in the population.
- (3) directional as it pushes the mean of the character in one direction.
- (4) disruptive as it splits the population into two, one yielding higher output and the other lower output.

Students may find this in CP sheet : Theory Page No.219]

Ans. [2]

Sol. In Directional selection one Extreme is favoured for selection as compared to the other extreme phenotype.

Q.83 Select the **mismatch** :

- (1) *Rhizobium* - Alfalfa
- (2) *Franaia* - *Alnus*
- (3) *Rhodospirillum* - Mycorrhiza
- (4) *Anabaena* - Nitrogen fixer

Students may find similar question in CP exercise sheet : Plant physiology

[Chapter : Mineral Nutritiaion & N₂ metabolism, Theory Page No.219]

Ans. [3]

Sol. Rhodospirillum is a free living N₂ fixing microbe.

Q.84 Presence of plants arranged into well defined vertical layers depending on their height can be seen best in :

- (1) Temperate Forest
- (2) Tropical Savannah
- (3) Tropical Rain Forest
- (4) Grassland

Students may find similar question in CP exercise sheet : Ecology

[Chapter :population & community, Theory Page No 53]

Ans. [3]

Sol. Tropical Rain forest show clear cut stratification of vegetations.



Q.85 Match the following sexually transmitted diseases (Column – I) with their causative agent (Column – II) and select the correct option.

- | Column – I | Column – II |
|-------------------|------------------------------|
| (a) Gonorrhoea | (i) HIV |
| (b) Syphilis | (ii) <i>Neisseria</i> |
| (c) Genital Warts | (iii) <i>Treponema</i> |
| (d) AIDS | (iv) Human papilloma – virus |

Options :

- | | | | |
|-----------|-------|-------|------|
| (a) | (b) | (c) | (d) |
| (1) (iv) | (iii) | (ii) | (i) |
| (2) (ii) | (iii) | (iv) | (i) |
| (3) (iii) | (iv) | (i) | (ii) |
| (4) (iv) | (ii) | (iii) | (i) |

Students may find similar question in CP exercise sheet : Immunity and Disease

[Page No.138]

Ans. [2]

Sol. C

Q.86 Select the mismatch :

- | | | |
|----------------------|---|---------------|
| (1) <i>Equisetum</i> | - | Homosporous |
| (2) <i>Pinus</i> | - | Dioecious |
| (3) <i>Cycas</i> | - | Dioecious |
| (4) <i>Salvinia</i> | - | Heterosporous |

Students may find this in CP sheet :Plant Diversity, Page No.134

Ans. [2]

Sol. In *Pinus*, both male and female cones are present are same plant i.e monoecious

Q.87 The region of Biosphere Reserve which is legally protected and where no human activity is allowed is known as :

- (1) Restoration zone
- (2) Core zone
- (3) Buffer zone
- (4) Transition zone

Students may find similar question in CP exercise sheet : Ecology

[Chapter : Biodiversity, Theory Page No.46]

Ans. [2]

Sol. Core zone of biosphere reserves is totally undisturbed zone.

- Q.88** Identify the **wrong statement** in context of heartwood :
- (1) It comprises dead elements with highly lignified walls
 - (2) Organic compounds are deposited in it
 - (3) It is highly durable.
 - (4) It conducts water and minerals efficiently

*Students may find similar question in CP exercise sheet : Structural Organisation in Plants
Exercise # 2, Page No.73, Q.265*

Ans. [4]

Sol. The wrong statement in context to heartwood is "It conducts water and minerals efficiently.

- Q.89** The function of copper ions in copper releasing IUD's is :
- (1) They inhibit ovulation
 - (2) They suppress sperm motility and fertilising capacity of sperms.
 - (3) They inhibit gametogenesis.
 - (4) They make uterus unsuitable for implantation

Students may find this in CP sheet : Reproductive health, Theory, Page No.59

Ans. [2]

- Q.90** The process of separation and purification of expressed protein before marketing is called :
- (1) Postproduction processing
 - (2) Upstream processing
 - (3) Downstream processing
 - (4) Bioprocessing

Students may find this in CP sheet : Biotechnology, Page No. 108

Ans. [3]

- Q.91** Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen ?
- (1) *Nostoc*
 - (2) *Bacillus*
 - (3) *Pseudomonas*
 - (4) **Mycoplasma**

Students may find this in CP sheet : Plant Diversity, Page No.44

Ans. [4]

Sol. Mycoplasma lack cell wall and are facultative anaerobe i.e can survive in absence of oxygen also.

- Q.92** **Phosphoenol pyruvate (PEP)** is the primary CO₂ acceptor in :
- (1) C₃ and C₄ plants
 - (2) C₃ plants
 - (3) C₄ plants
 - (4) C₂ plants

Students may find similar question in CP exercise sheet : Plant physiology

[Chapter : Photosynthesis, Theory Page No.21]

Ans. [3]

Sol. Phospho enol pyruvate (PEP) is primary CO₂ acceptor in C₄ plants.



- Q.93** MALT constitutes about _____ percent of the lymphoid tissue in human body.
(1) 10% (2) 50% (3) 20% (4) 70%

Students may find this in CP sheet : Human health and Disease

Ans. [2]

- Q.94** The DNA fragments separated on an agarose gel can be visualised after staining with :
(1) Ethidium bromide (2) Bromophenol blue (3) Acetocarmine (4) Aniline blue

Students may find this in CP sheet : Biotechnology : Principle and Process

Ans. [1]

- Q.95** Capacitation occurs in :
(1) Female Reproductive tract (2) Rete testis
(3) Epididymis (4) Vas deferens

Ans. [1]

Sol. Capacitation is a phenomenon that occur in vagina, due to it the sperms aquire ability to swim through female reproductive tract & fertilise the egg in fallopian tube.

- Q.96** Which of the following is **correctly matched** for the product produced by them ?
(1) *Saccharymyces cerevisiae* : Ethanol (2) *Acetobacter aceti* : Antibiotics
(3) *Methanobacterium* : Lactic acid (4) *Penicillium notatum* : Acetic acid

Students may find this in CP sheet :Plant Diversity, Page No.84

Ans. [1]

Sol. *Saccharomyces cerevisiae* (yeast) is used in commercial production of Ethanol.

- Q.97** Which of the following statements is **correct**?
(1) The descending limb of loop of Henle is permeable to electrolytes.
(2) The ascending limb of loop of Henle is impermeable to water.
(3) The descending limb of loop of Henle is impermeable to water.
(4) The ascending limb of loop of Henle is permeable to water.

Students may find this in CP sheet : Excretory System, Theory, Page No.19

Ans. [2]

- Q.98** The water potential of pure water is :
(1) More than one (2) Zero
(3) Less than zero (4) More than zero but less than one

Students may find similar question in CP exercise sheet : Plant physiology

[Chapter : Plants water Relation, Theory Page No.182]

Ans. [2]

Sol. Water Potential or free energy of pore water / pure solvent is maximum i.e zero as system not Performing any work.

- Q.99** The genotypes of a Husband and Wife are $I^A I^B$ and $I^A i$.
Among the blood types of their children, how many different genotypes and phenotypes are possible?
- (1) 4 genotypes ; 4 phenotypes (2) 3 genotypes ; 3 phenotypes
(3) 3 genotypes ; 4 phenotypes (4) 4 genotypes ; 3 phenotypes

Students may find this in CP sheet : Genetics, Page No. 21

Ans. [4]

Sol.

	I^A	I^B
I^A	$I^A I^A$	$I^A I^B$
i	$I^A i$	$I^B i$

Blood group or phenotype is A, B, AB so 3 phenotype

Genotype - 4

- Q.100** An important characteristic that Hemichordates share with Chordates is :
- (1) pharynx without gill slits (2) absence of notochord
(3) ventral tubular nerve cord (4) pharynx with gill slits

Students may find this in class notes

Ans. [4]

Sol. Hemichordates have pharyngeal gill slits which similar to the chordates.

- Q.101** Which one of the following is related to Ex-situ conservation of threatened animals and plants ?
- (1) Himalayan region (2) Wildlife Safari Parks
(3) Biodiversity hot spots (4) Amazon rainforest

Students may find similar question in CP exercise sheet : Ecology

[Chapter : Biodiversity Theory, Page No. 144,]

Ans. [2]

Sol. Wild life safari parks are the ex-situ conservation strategy

- Q.102** Which of the following in sewage treatment removes suspended solids ?
- (1) Sludge treatment (2) Tertiary treatment
(3) Secondary treatment (4) Primary treatment

Students may find similar question in CP exercise sheet : Ecology

[Chapter : Environmental Issue Theory, Page No. 181]

Ans. [4]

Sol. Primary treatment in Sewage treatment plant involves filtration & Sedimentation leads to separation of suspended solids.

Q.103 Out of 'X' pairs of ribs in humans only 'Y' pairs are true ribs. Select the option that correctly represents values of X and Y and provides their explanation :

- (1) X = 24, Y = 12 True ribs are dorsally attached to vertebral column but are free on ventral side.
- (2) X = 12, Y = 7 True ribs are attached dorsally to vertebral column and ventrally to the sternum.
- (3) X = 12, Y = 5 True ribs are attached dorsally to vertebral column and sternum on the two ends.
- (4) X = 24, Y = 7 True ribs are dorsally attached to vertebral column but are free on ventral side.

Students may find this in CP sheet : Skeletal System, Page No. 107

Ans. [2]

Q.104 Double fertilization is exhibited by :

- (1) Angiosperms
- (2) Gymnosperms
- (3) Algae
- (4) Fungi

Ans. [1]

Sol. Double fertilization and triple fusion are characteristic feature of angiosperms.

Q.105 Attractants and rewards are required for :

- (1) Cleistogamy
- (2) Anemophily
- (3) Entomophily
- (4) Hydrophily

Ans. [3]

Sol. Attractants and Rewards are required to attract insects for pollination i.e. entomophily

Q.106 Which one from those given below is the period for Mendel's hybridization experiments ?

- (1) 1870 – 1877
- (2) 1856 – 1863
- (3) 1840 – 1850
- (4) 1857 – 1869

Students may find this in CP sheet : Genetics, Page No. 4

Ans. [2]

Q.107 Receptor sites for neurotransmitters are present on

- (1) post-synaptic membrane
- (2) membranes of synaptic vesicles
- (3) pre-synaptic membrane
- (4) tips of axons

Students may find similar question in CP exercise sheet : Animal Physiology - II

Ans. [1]

Sol. Receptor site the neurotransmitters are present on postsynaptic membrane.

Q.108 Which among these is the **correct** combination of aquatic mammals ?

- (1) *Trygon*, Whales, Seals
- (2) Seals, Dolphins, Sharks
- (3) Dolphins, Seals, *Trygon*
- (4) Whales, Dolphins, Seals

Students may find this in CP sheet : Animal Diversity, Page No. 130

Ans. [4]

Sol. Whale, Dolphins, Seals are aquatic mammals belongs order cetacean.

Q.109 Good vision depends on adequate intake of carotene rich food.

Select the best option from the following statements.

- (a) Vitamin A derivatives are formed from carotene.
- (b) The photopigments are embedded in the membrane discs of the inner segment
- (c) Retinal is derivative of Vitamin A
- (d) Retinal is a light absorbing part of all the visual photopigments

Options :

- (1) (b), (c) and (d) (2) (a) and (b) (3) (a), (c) and (d) (4) (a) and (c)

Students may find similar question in CP exercise sheet : Animal Physiology - I

[Page No. 161]

Ans. [3]

Sol. Carotene is precursor of vitamin A. It is required for synthesis of visual pigments in rods & cone cells of retina.

Q.110 What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis ?

- (1) Negatively charged fragments do not move
- (2) The larger the fragment size, the farther it moves
- (3) The smaller the fragment size, the farther it moves
- (4) Positively charged fragment move to farther end

Students may find this in CP sheet : Genetics, Page No. 42

Ans. [3]

Q.111 Hypersecretion of Growth Hormone in adults does not cause further increase in height, because :

- (1) Muscle fibres do not grow in size after birth
- (2) Growth Hormone becomes inactive in adults
- (3) Epiphyseal plates close after adolescence
- (4) Bones lose their sensitivity to Growth Hormone in adults

Students may find similar question in CP exercise sheet : Animal Physiology - I

[Page No. 24]

Ans. [3]

Sol. Hypersecretion of growth hormone in adults does not cause further increases in height because the epiphysial plates (growth plates) closes after adolescence.

Q.112 Which of the following represents order of 'Horse' ?

- (1) Ferus (2) Equidae (3) Perissodactyla (4) Caballus

Students may find this in CP sheet : Animal Diversity, Page No. 131

Ans. [3]

Sol. Horse belongs to order parissodactyla of class mammalia

Order parissodactyla consist mammals with odd toes.

Q.113 Thalassemia and sickle cell anemia are caused due to a problem in globin molecule synthesis. Select the **correct** statement.

- (1) Sickle cell anemia is due to a quantitative problem of globin molecules
- (2) Both are due to a qualitative defect in globin chain synthesis
- (3) Both are due to a quantitative defect in globin chain synthesis
- (4) Thalassemia is due to less synthesis of globin molecules

Ans. [4]

Sol. NCERT-XII Bio Topic – Supplementary Material for Senior Secondary biology – Thalassemia & class notes

Q.114 Myelin sheath is produced by :

- (1) Osteoclasts and Astrocytes
- (2) Schwann Cells and Oligodendrocytes
- (3) Astrocytes and Schwann Cells
- (4) Oligodendrocytes and Osteoclasts

Students may find this in CP sheet : Animal Physiology - II

Ans. [2]

Sol. Myelin sheath is produced by Schwann cells in PNS & oligodendrocyte cells in CNS.

Q.115 Homozygous purelines in cattle can be obtained by :

- (1) mating of individuals of different species
- (2) mating of related individuals of same breed
- (3) mating of unrelated individuals of same breed
- (4) mating of individuals of different breed

Students may find similar question in CP exercise sheet : Genetics & Class Notes

Page No. 6]

Ans. [2]

Q.116 Mycorrhizae are the example of :

- (1) Mutualism
- (2) Fungistasis
- (3) Amensalism
- (4) Antibiosis

Students may find similar question in CP exercise sheet : Ecology

[Chapter : Population & Community Theory, Page No. 67]

Ans. [1]

Sol. Mycorrhiza is mutualistic interaction between algae & fungi

Q.117 A baby boy aged two years is admitted to play school and passes through a dental check-up. The dentist observed that the boy had twenty teeth. Which teeth were absent ?

- (1) Molars
- (2) Incisors
- (3) Canines
- (4) Pre-molars

Students may find similar question in CP exercise sheet : Animal Physiology-I, Page No. 133

Ans. [4]

Sol. Premolar teeth are absent in child who bears only milk teeth.

Q.118 Among the following characters, which one was **not** considered by Mendel in his experiments on pea ?

- (1) Pod-Inflated or Constricted (2) Stem-Tall or Dwarf
(3) Trichomes-Glandular or non-glandular (4) Seed-Green or Yellow

Students may find this in CP sheet : Genetics, Page No. 5

Ans. [3]

Q.119 The hepatic portal vein drains blood to liver from :

- (1) Intestine (2) Heart (3) Stomach (4) Kidneys

Ans. [1]

Sol. Hepatic portal vein carries nutrient rich blood from intestine to liver.

Q.120 Which cells of ‘Crypts of Lieberkuhn’ secrete antibacterial lysozyme ?

- (1) Kupffer cells (2) Argentaffin cells (3) Paneth cells (4) Zymogen cells

Ans. [3]

Sol. Antibacterial lysozymes are produced by paneth cells present in crypts of Lieberkuhn.

Q.121 Spliceosomes are **not** found in cells of :

- (1) Bacteria (2) Plants (3) Fungi (4) Animals

Students may find this in CP sheet :Protoplasm, Page No.136

Ans. [1]

Sol. Spliceosomes are required for splicing of introns which are absent in Bacteria.

Q.122 Frog’s heart when taken out of the body continues to beat for sometime.

Select the best option from the following statements.

- (a) Frog is a poikilotherm
(b) Frog does not have any coronary circulation
(c) Heart is “myogenic” in nature
(d) Heart is autoexcitable

Options :

- (1) (c) and (d) (2) Only (c) (3) Only (d) (4) (a) and (b)

Students may find this in CP sheet : Lower Animal

Ans. [1]

Sol. Frog’s heart is myogenic and auto excitable

Q.123 Functional megaspore in an angiosperm develops into :

- (1) Embryo (2) Ovule (3) Endosperm (4) Embryo sac

Ans. [4]

Sol. Functional megaspore in an angiosperm develops into female gametophyte i.e embryo sac.

Q.124 Alexander Von Humbolt described for the first time :

- (1) Population Growth equation (2) Ecological Biodiversity
(3) Laws of limiting factor (4) Species are relationships

Students may find similar question in CP sheet :Ecology

[Chapter :Biodiversity theory, Page No.138]

Ans. [4]

Sol. Alexander Von Humbolt imposed species area relationship.

Q.125 The morphological nature of edible part of coconut is :

- (1) Pericarp (2) Perisperm (3) Cotyledon (4) Endosperm

Students may find similar question in CP exercise sheet : Structural Organisation in Plants

Theory Chart, Page No.117

Ans. [4]

Sol. Endosperm is edible part of coconut.

Q.126 A temporary endocrine gland in the human body is :

- (1) Corpus allatum (2) Pineal gland (3) Corpus cardiacum (4) Corpus luteum

Students may find similar question in CP sheet :Animal physiology-II Page No.174

Ans. [4]

Sol. Temporary endocrine gland in human body is corpus luteum present in ovaries. It is formed from graafian follicles after ovulation and produce hormones like progesterone and estrogens.

Q.127 Flowers which have single ovule in the ovary and are packed into inflorescence are usually pollinated by :

- (1) Bat (2) Water (3) Bee (4) Wind

Ans. [4]

Sol. Wind pollinated (Anemophilous) flowers occur in inflorescence and has single ovule in the ovary.

Q.128 The pivot joint between atlas and axis is a type of :

- (1) saddle joint (2) fibrous joint (3) cartilaginous joint (4) synovial joint

Students may find similar question in CP sheet : Animal physiology-II Page No.177

Ans. [4]

Sol. Median at lento axial joint is a pivot type of synovial joint which helps in rotatory movements.

Q.129 A decrease in blood pressure/volume will **not** cause the release of :

- (1) ADH (2) Renin
(3) Atrial Natriuretic Factor (4) Aldosterone

Students may find similar question in CP exercise sheet : Animal Physiology-II, Page no.177

Ans. [3]

Sol. Fall in blood pressure/blood volume will not cause release of atrial natriuretic factor (ANF) because it causes fall in blood pressure/blood volume by suppressing release of rennin.



Q.130 Which ecosystem has the maximum biomass ?

- (1) Lake ecosystem (2) Forest ecosystem
(3) Grassland ecosystem (4) Pond ecosystem

Students may find similar question in CP sheet : Ecology

[Chapter : Ecosystem, Page No.98]

Ans. [2]

Sol. Forest ecosystem possesses highest biomass.

Q.131 A disease caused by an autosomal primary non-disjunction is :

- (1) Sickle Cell Anemia (2) Down's Syndrome
(3) Klinefelter's Syndrome (4) Turner's Syndrome

Students may find similar question in CP exercise sheet : Immunity and Disease

[Page No.133]

Ans. [2]

Q.132 Which of the following cell organelles is responsible for extracting energy from carbohydrates to form ATP?

- (1) Mitochondrion (2) Lysosome
(3) Ribosome (4) Chloroplast

Students may find similar question in CP exercise sheet : Plant Physiology

[Chapter : Cell Respiration, Page No.72,]

Ans. [1]

Sol. Mitochondria (Power house of cell) is responsible for extracting energy from carbohydrates to ATP by electron transport system.

Q.133 DNA replication in bacteria occurs-

- (1) Just before transcription (2) During S phase
(3) Within nucleolus (4) Prior to fission

Ans. [4]

Sol. DNA replication in bacteria occurs.

Q.134 In case of a couple where the male is having a very low sperm count, which technique will be suitable for fertilization ?

- (1) Intracytoplasmic sperm injection
(2) Intrauterine transfer
(3) Gamete intracytoplasmic fallopian transfer
(4) Artificial Insemination

Students may find this in CP sheet : Reproductive Health, Page No.61]

Ans. [4]



Q.135 Which one of the following statements is **not** valid for aerosols ?

- (1) They have negative impact on agricultural land
- (2) They are harmful to human health
- (3) They alter rainfall and monsoon patterns
- (4) They cause increased agricultural productivity

Students may find similar question in CP exercise sheet : Ecology

[Chapter : Environmental issues, Page No.170,]

Ans. [4]

Sol. Aerosols are air pollutants produces as smog, fog and decrease the agricultural productivity.

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Q.140 Radioactive material 'A' has decay constant ' 8λ ' and material 'B' has decay constant ' λ '. Initially they have same number of nuclei. After what time, the ratio of number of nuclei of material 'B' to that 'A' will be $\frac{1}{e}$?

- (1) $\frac{1}{9\lambda}$ (2) $\frac{1}{\lambda}$ (3) $\frac{1}{7\lambda}$ (4) $\frac{1}{8\lambda}$

Students may find similar question in CP Class notes of Chapter : Radioactivity

Ans. [3/Bonus]

Sol.

	A	B
$t = 0$	N_0	N_0
	8λ	λ

$t = ?$ $N_A = N_0 e^{-8\lambda t}$

$\frac{N_A}{N_B} = \frac{1}{e}$ $N_B = N_0 e^{-\lambda t}$

$$\frac{N_B}{N_A} = \frac{N_0 e^{-\lambda t}}{N_0 e^{-8\lambda t}} = \frac{1}{e}$$

$$e^{7\lambda t} = e^{-1}$$

$$7\lambda t = -1$$

$$t = -\frac{1}{7\lambda}$$

(time never be negative that why question is bonus)

Q.141 The given electrical network is equivalent to



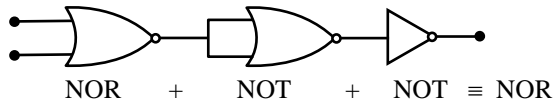
- (1) NOT gate (2) AND gate (3) OR gate (4) NOR gate

Students may find similar question in CP exercise sheet :

[Chapter : Electronics, Exercise # 3(A), Page No.190, Q.171]

Ans. [4]

Sol.



Q.142 The ratio of resolving powers of an optical microscope for two wavelengths $\lambda_1 = 4000 \text{ \AA}$ and $\lambda_2 = 6000 \text{ \AA}$ is

- (1) 16 : 81 (2) 8 : 27 (3) 9 : 4 (4) 3 : 2

Students may find similar question in CP Class notes of Chapter : Ray Optics

Ans. [4]

Sol. R.P. $\propto \frac{1}{\lambda}$



$$\left(\frac{R.P_1}{R.P_2} \right) = \frac{\lambda_2}{\lambda_1} = \frac{6000}{4000} = \frac{3}{2}$$

- Q.143** In a common emitter transistor amplifier the audio signal voltage across the collector is 3 V. The resistance of collector is 3 kΩ. If current gain is 100 and the base resistance is 2 kΩ, the voltage and power gain of the amplifier is :
 (1) 20 and 2000 (2) 200 and 1000 (3) 15 and 200 (4) 150 and 15000

Students may find similar question in CP Class notes of Chapter : Semiconductor

Ans. [4]

Sol. $A_v = \beta \frac{R_O}{R_{in}} = \beta \frac{R_C}{R_B} = 100 \times \frac{3k\Omega}{2k\Omega} = 150$

$$A_p = \beta^2 \frac{R_C}{R_B} = 100 \times 100 \times \frac{3}{2} = 15000$$

- Q.144** Two cars moving in opposite directions approach each other with speed of 22 m/s and 16.5 m/s respectively. The driver of the first car blows a horn having a frequency 400 Hz. The frequency heard by the driver of the second car is [velocity of sound 340 m/s] :
 (1) 448 Hz (2) 350 Hz (3) 361 Hz (4) 411 Hz

Students may find similar question in CP exercise sheet :

[Chapter : Doppler Effect, Exercise # 3(B), Page No.85, Q.291]

Ans. [1]

Sol. $n' = n \left(\frac{v + v_0}{v - v_s} \right)$
 $= 400 \left[\frac{340 + 16.5}{340 - 22} \right] \text{ Hz}$
 $= 400 \times \frac{356.5}{318} \text{ Hz}$
 $= 448.427 \text{ Hz}$

- Q.145** Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will :
 (1) will become stationary (2) keep floating at the same distance between them.
 (3) move towards each other (4) move away from each other.

Students may find similar question in CP Class notes of Chapter : Gravitation

Ans. [3]

Sol. Move towards each other due to mutual gravitational force.

Q.146 A gas mixture consists of 2 moles of O₂ and 4 moles of Ar at temperature T. Neglecting all vibrational modes, the total internal energy of the system is :

- (1) 11 RT (2) 4 RT (3) 15 RT (4) 9 RT

Students may find similar question in CP exercise sheet :

[Chapter : K.T.G., Exercise # 3(A), Page No.143, Q.251]

Ans. [1]

Sol. O₂ + Ar
 2 mole 4 moles
 T T

$$U_{O_2} = \mu C_v T$$

$$= 2 \left(\frac{5}{2} R \right) T = 5RT$$

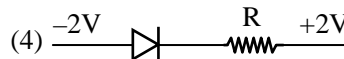
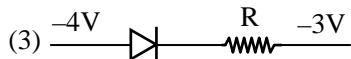
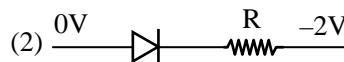
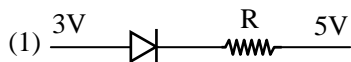
$$U_{Ar} = (4) \left(\frac{3}{2} R \right) (T) = 6RT$$

$$U_{mix} = U_{O_2} + U_{Ar}$$

$$= 5RT + 6RT$$

$$= 11 RT$$

Q.147 Which one of the following represents forward bias diode ?

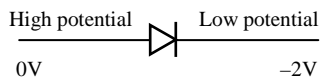


Students may find similar question in CP exercise sheet :

[Chapter : Semiconductor, Exercise # 3(A), Page No.194, Q.64]

Ans. [2]

Sol.



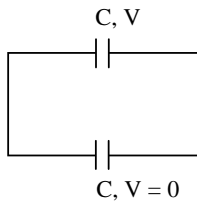
Q.148 A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At the centre of the solenoid, a coil of 100 turns and radius 0.01 m is placed with its axis coinciding with the solenoid axis. The current in the solenoid reduces at a constant rate to 0A from 4 A in 0.05 s. If the resistance of the coil is $10 \pi^2 \Omega$, the total charge flowing through the coil during this time is :

- (1) $16 \pi \mu C$ (2) $32 \pi \mu C$ (3) $16 \mu C$ (4) $32 \mu C$

Students may find similar question in CP exercise sheet :

[Chapter : EMI, Exercise # Example, Page No.159, Q.18]

$$U_{\text{system}} = \frac{1}{2} CV^2$$



$$\text{Energy loss} = \frac{C_1 C_2}{2(C_1 + C_2)} (V_1 - V_2)^2$$

$$= \frac{C \times C}{2(C + C)} (V - 0)^2$$

$$= \frac{1}{4} CV^2$$

= U_{system} becomes half.

Q.151 The acceleration due to gravity at a height 1 km above the earth is the same as at a depth d below the surface of earth. Then :

- (1) $d = 2\text{km}$ (2) $d = \frac{1}{2}\text{km}$ (3) $d = 1\text{km}$ (4) $d = \frac{3}{2}\text{km}$

Students may find similar question in CP exercise sheet :

[Chapter : Gravitation, Exercise # 3(B), Page No.219, Q.35]

Ans. [1]

Sol. $g_h = g_d$

$$g \left(1 - \frac{2h}{R} \right) = g \left(1 - \frac{d}{R} \right)$$

$$d = 2h = 2 \times 1 = 2 \text{ km}$$

Q.152 A particle executes linear simple harmonic motion with an amplitude of 3 cm. When the particle is at 2 cm from the mean position, the magnitude of its velocity is equal to that of its acceleration. Then its time period in seconds is :

- (1) $\frac{2\pi}{\sqrt{3}}$ (2) $\frac{\sqrt{5}}{\pi}$ (3) $\frac{\sqrt{5}}{2\pi}$ (4) $\frac{4\pi}{\sqrt{5}}$

Students may find similar question in CP exercise sheet :

[Chapter : S.H.M., Exercise # Example, Page No.238, Q.6]

Ans. [4]

Sol. $v = \omega \sqrt{a^2 - x^2}$

$$|f| = \omega^2 x$$

$$\omega^2 x = \omega \sqrt{a^2 - x^2}$$

$$\begin{aligned} K.E_{\max} &= E_{ph} - W \\ &= 3.81 - 4.88 \\ &= 1.074 \text{ eV} \end{aligned}$$

$$\begin{aligned} v_{\max} &= \sqrt{\frac{2}{m_e} K.E_{\max}} \\ &= \sqrt{\frac{2 \times 1.074 \times 1.6 \times 10^{-19}}{9.1 \times 10^{-31}}} \\ &= \sqrt{\frac{3.2 \times 1.074}{9.1} \times 10^{11}} \\ &= \sqrt{3.7 \times 10^{10}} = 6 \times 10^5 \text{ m/s} \end{aligned}$$

Q.155 Suppose the charge of a proton and an electron differ slightly. One of them is $-e$, the other is $(e + \Delta e)$. If the net of electrostatic force and gravitational force between two hydrogen atoms placed at a distance d (much greater than atomic size) apart is zero, then Δe is of the order of [Given mass of hydrogen $m_h = 1.67 \times 10^{-27}$ kg]

- (1) 10^{-47} C (2) 10^{-20} C (3) 10^{-23} C (4) 10^{-37} C

Students may find similar question in CP exercise sheet :

[Chapter : Electrostatics, Exercise # 1, Page No.50, Q.61]

Ans. [4]

Sol. $F_e = F_g$

$$\frac{K(\Delta e)(\Delta e)}{d^2} = \frac{G(1.67 \times 10^{-27})(1.67 \times 10^{-27})}{d^2}$$

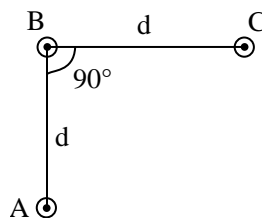
$$(\Delta e)^2 = \frac{6.6 \times 10^{-11} \times (1.67 \times 10^{-27})^2}{9 \times 10^9}$$

$$(\Delta e)^2 = 2.045 \times 10^{-74}$$

$$\Delta e \approx 1.4 \times 10^{-37}$$

$$\Delta e = 10^{-37}$$

Q.156 An arrangement of three parallel straight wires placed perpendicular to plane of paper carrying same current 'I' along the same direction is shown in Fig. Magnitude of force per unit length on the middle wire 'B' is given by :



- (1) $\frac{\mu_0 i^2}{\sqrt{2} \pi d}$ (2) $\frac{\mu_0 i^2}{2 \pi d}$ (3) $\frac{2\mu_0 i^2}{\pi d}$ (4) $\frac{\sqrt{2}\mu_0 i^2}{\pi d}$

Students may find similar question in CP Class notes of Chapter : Magnetic Field

$$2\theta = \frac{y}{x} \quad \theta = \frac{y}{2x}$$

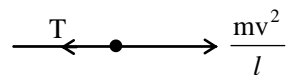
Q.159 One end of string of length l is connected to a particle of mass 'm' and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed 'v' the net force on the particle (directed towards center) will be (T represents the tension in the string)

- (1) Zero (2) T (3) $T + \frac{mv^2}{l}$ (4) $T - \frac{mv^2}{l}$

Students may find similar question in CP Class notes of Chapter : Circular Motion

Ans. [2]

Sol.



$$F_{\text{net}} = T = \frac{mv^2}{l}$$

Q.160 A physical quantity of the dimensions of length that can be formed out of c , G and $\frac{e^2}{4\pi\epsilon_0}$ is [c is velocity of light, G is universal constant of gravitation and e is charge] ;

- (1) $\frac{1}{c} G \frac{e^2}{4\pi\epsilon_0}$ (2) $\frac{1}{c^2} \left[G \frac{e^2}{4\pi\epsilon_0} \right]^{1/2}$ (3) $c^2 \left[G \frac{e^2}{4\pi\epsilon_0} \right]^{1/2}$ (4) $\frac{1}{c^2} \left[\frac{e^2}{G4\pi\epsilon_0} \right]^{1/2}$

Students may find similar question in CP exercise sheet :

 [Chapter : Unit & Dimension, Exercise # 1(B), Page No.19, Q.221]

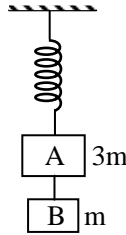
Ans. [2]

Sol. $M^0 L^1 T^0 Q^0 = c^x G^y \left(\frac{e^2}{4\pi\epsilon_0} \right)^z$

$$= [M^0 L T^{-1}]^x \left[\frac{M^1 L^1 T^{-2} \times L^2}{M^2} \right]^y [M^1 L^1 T^{-2} \times L^2]^z$$

$-y + z = 0$ (i)
 $x + 3y + 3z = 1$ (ii)
 $-x - 2y - 2z = 0$ (iii)
 $x = -2$
 $y = z = \frac{1}{2}$

Q.165 Two blocks A and B of masses $3m$ and m respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively :



(1) $\frac{g}{3}, \frac{g}{3}$

(2) $g, \frac{g}{3}$

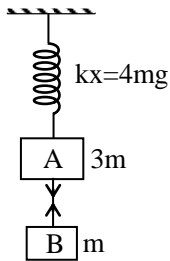
(3) $\frac{g}{3}, g$

(4) g, g

Students may find similar question in CP DPPS-11, Chapter : N.L.M.

Ans. [3]

Sol. When string AB is cut



For B block $mg = ma$

$$a = g$$

For A block $kx - 3mg = 3ma$

$$4mg - 3mg = 3ma$$

$$a = \frac{g}{3}$$

Q.166 If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip θ is given by :

(1) $\tan^2 \theta = \tan^2 \theta_1 - \tan^2 \theta_2$

(2) $\cot^2 \theta = \cot^2 \theta_1 + \cot^2 \theta_2$

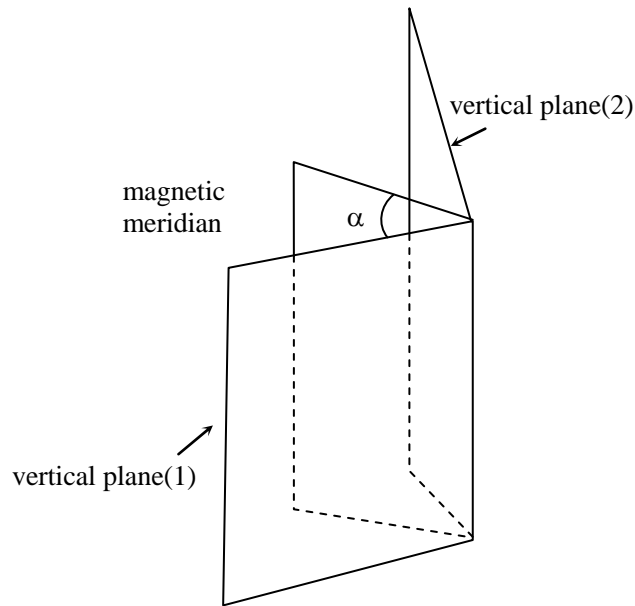
(3) $\tan^2 \theta = \tan^2 \theta_1 + \tan^2 \theta_2$

(4) $\cot^2 \theta = \cot^2 \theta_1 - \cot^2 \theta_2$

Students may find similar question in CP Class notes of Chapter : Magnetic Field

Ans. [2]

Sol.



Relation between real and apparent dip

$$\tan \theta' = \frac{\tan \theta}{\cos \alpha}$$

For MM and plane (1)

$$\tan \theta_1 = \frac{\tan \theta}{\cos \alpha}$$

$$\Rightarrow \cos \alpha = \frac{\tan \theta}{\tan \theta_1} \quad \dots(1)$$

For MM and plane (2)

$$\tan \theta_2 = \frac{\tan \theta}{\cos(90^\circ - \alpha)}$$

$$\therefore \sin \alpha = \frac{\tan \theta}{\tan \theta_2} \quad \dots(2)$$

$$(1)^2 + (2)^2$$

$$1 = \frac{\tan^2 \theta}{\tan^2 \theta_1} + \frac{\tan^2 \theta}{\tan^2 \theta_2}$$

$$\therefore \cot^2 \theta = \cot^2 \theta_1 + \cot^2 \theta_2$$

Q.167 The bulk modulus of a spherical object is 'B'. If it is subjected to uniform pressure 'p', the fractional decrease in radius is :

(1) $\frac{p}{3B}$

(2) $\frac{p}{B}$

(3) $\frac{B}{3p}$

(4) $\frac{3p}{B}$

Students may find similar question in CP exercise sheet :

[Chapter : Properties of Matter, Exercise # 1(B), Page No.186, Q.22]

Ans. [1]

Students may find similar question in CP exercise sheet :

[Chapter : Heat transfer, Exercise # 3(A), Page No.218, Q.6]

Ans. [2]

Sol. It is a parallel combination then equivalent conductivity of combination is

$$\boxed{K_{\text{eq}} = \frac{K_1 + K_2}{2}} \quad \left(\begin{array}{l} L_1 = L_2 \\ A_1 = A_2 \end{array} \right)$$

Q.170 Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1 . On other days, if she remains stationary on the moving escalator, then the escalator takes her up in time t_2 . The time taken by her to walk up on the moving escalator will be :

- (1) $t_1 - t_2$ (2) $\frac{t_1 + t_2}{2}$ (3) $\frac{t_1 t_2}{t_2 - t_1}$ (4) $\frac{t_1 t_2}{t_2 + t_1}$

Students may find similar question in CP exercise sheet :

[Chapter : One Dimension Motion, Exercise # 2, Page No.109, Q.8]

Ans. [4]

Sol. $v_t = v_{\text{es}} + v_{\text{preeti}}$

$$\frac{d}{t} = \frac{d}{t_2} + \frac{d}{t_1}$$

$$\frac{1}{t} = \frac{t_1 + t_2}{t_1 t_2}$$

$$t = \frac{t_1 t_2}{t_1 + t_2}$$

Q.171 Two discs of same moment of inertia rotating about their regular axis passing through centre and perpendicular to the plane of disc with angular velocities ω_1 and ω_2 . They are brought into contact face to face coinciding the axis of rotation. The expression for loss of energy during this process is :

- (1) $\frac{I}{8} (\omega_1 - \omega_2)^2$ (2) $\frac{1}{2} I (\omega_1 + \omega_2)^2$ (3) $\frac{1}{4} I (\omega_1 - \omega_2)^2$ (4) $I (\omega_1 - \omega_2)^2$

Students may find similar question in CP exercise sheet :

[Chapter : Rotational Motion, Exercise # 3(A), Page No.162, Q.28]

Ans. [3]

Sol. Using law of conservation of angular momentum

$$I\omega_1 + I\omega_2 = 2I\omega'$$

$$\omega' = \frac{\omega_1 + \omega_2}{2}$$

so loss of energy

$$\begin{aligned}\Delta KE_{\text{loss}} &= \frac{1}{2} I \omega_1^2 + \frac{1}{2} I \omega_2^2 - \frac{1}{2} I \left(\frac{\omega_1 + \omega_2}{2} \right)^2 \\ &= \frac{1}{2} I \left(\omega_1^2 + \omega_2^2 - \frac{\omega_1^2 + \omega_2^2 + 2\omega_1\omega_2}{2} \right) \\ &= \frac{1}{4} I (\omega_1^2 + \omega_2^2 - 2\omega_1\omega_2) \\ &= \frac{1}{4} I (\omega_1 - \omega_2)^2\end{aligned}$$

Q.172 Which of the following statements are correct ?

- (a) Centre of mass of a body always coincides with the centre of gravity of the body.
(b) Centre of mass of a body is the point at which the total gravitational torque on the body is zero.
(c) A couple on a body produce both translational and rotational motion in a body
(d) Mechanical advantage greater than one means that small effort can be used to lift a large load.
(1) (c) and (d) (2) (b) and (d) (3) (a) and (b) (4) (b) and (c)

Students may find similar question in CP Class notes of Chapter : Work, Power & Energy

Ans. [2]

Sol. (b) centre of mass of a body is the point at which the total gravitational torque on the body is zero.

(d) Mechanical advantage = $\frac{\text{load}}{\text{effort}}$

M.A. will be more from one when load is more than effort

Q.173 A spherical black body with a radius of 12 cm radiates 450 watt power at 500 K. If the radius were halved and the temperature doubled, the power radiated in watt would be :

- (1) 1800 (2) 225 (3) 450 (4) 1000

Students may find similar question in CP exercise sheet :

[Chapter : Heat transfer, Exercise # 1, Page No.213, Q.65]

Ans. [1]

Sol. $P = eA\sigma T^4$

$$P = e(4\pi R^2) (\sigma T^4)$$

$$P \propto R^2 T^4$$

$$\begin{aligned}\frac{P_2}{P_1} &= \left(\frac{R_2}{R_1} \right)^2 \left(\frac{T_2}{T_1} \right)^4 \\ &= \left(\frac{R_1/2}{R_1} \right)^2 \left(\frac{2T}{T} \right)^4 \\ &= \frac{2^4}{2^2} = 2^2\end{aligned}$$

$$P_2 = 4P_1$$

$$= 4 \text{ (450)}$$

$$= 1800 \text{ watt}$$

Q.174 In an electromagnetic wave in free space the root mean square value of the electric field is $E_{\text{rms}} = 6\text{V/m}$. The peak value of the magnetic field is :

- (1) $4.23 \times 10^{-8} \text{ T}$ (2) $1.41 \times 10^{-8} \text{ T}$ (3) $2.83 \times 10^{-8} \text{ T}$ (4) $0.70 \times 10^{-8} \text{ T}$

Students may find similar question in CP Class notes of Chapter : E.M.W.

Ans. [3]

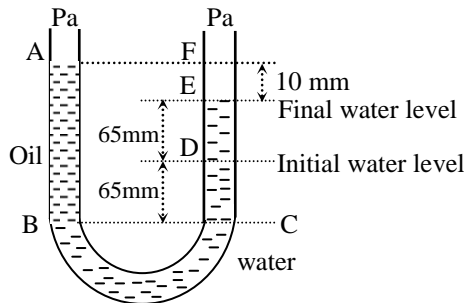
Sol. Speed of light $(c) = \frac{E_{\text{peak}}}{B_{\text{peak}}}$

$$3 \times 10^8 = \frac{\sqrt{2} \times 6}{B_{\text{peak}}}$$

$$B_{\text{peak}} = 2\sqrt{2} \times 10^{-8} \text{ T}$$

$$= 2.83 \times 10^{-8} \text{ T}$$

Q.175 A U tube with both ends open to the atmosphere, is partially filled with water. Oil, which is immiscible with water, is poured into one side until it stands at a distance of 10 mm above the water level on the other side. Meanwhile the water rises by 65 mm from its original level (see diagram). The density of the oil is :



- (1) 928 kg m^{-3} (2) 650 kg m^{-3} (3) 425 kg m^{-3} (4) 800 kg m^{-3}

Students may find similar question in CP exercise sheet :

[Chapter : Fluid Mechanics, Exercise # 1(B), Page No.227, Q.21]

Ans. [1]

Sol. $P_B = P_C$

$$P_a + \rho_{\text{oil}} g (140 \text{ mm}) = P_a + \rho_{\text{water}} g (130 \text{ mm})$$

$$\rho_{\text{oil}} = \rho_{\text{water}} \times \frac{130}{140}$$

$$= 1000 \frac{\text{kg}}{\text{m}^3} \times \frac{13}{14}$$

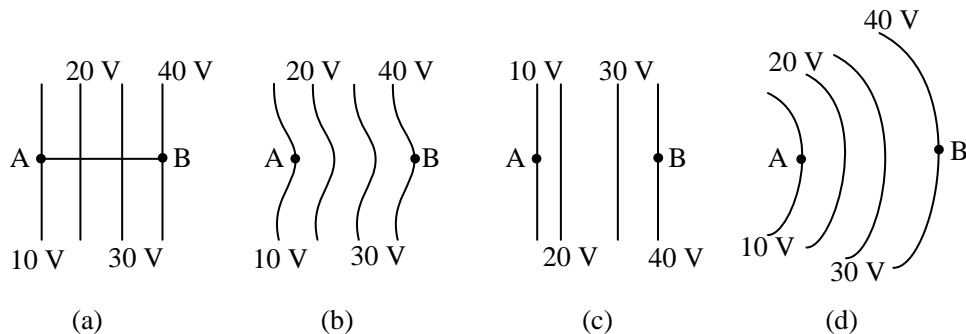
$$= 928 \text{ kg/m}^3$$

$$a_x = \frac{dv_x}{dt} = -4$$

$$a_y = \frac{dv_y}{dt} = 0$$

$$a = a_x = -4\text{m/s}^2$$

Q.179 The diagrams below show regions of equipotentials.



A positive charge is moved from A to B in each diagram.

- (1) Maximum work is required to move q in figure (b).
- (2) Maximum work is required to move q in figure (c).
- (3) In all the four cases the work done is the same .
- (4) Minimum work is required to move q in figure (a).

Students may find similar question in CP exercise sheet :

[Chapter : Electrostatics, Exercise # 1, Page No.43, Q.101 & 102]

Ans. [3]

Sol. $W = q [V_B - V_A]$

Does not depend on path. Depends on initial and final points only

\therefore same work in all diagram

Q.180 A spring of force constant k is cut into lengths of ratio 1 : 2 : 3. They are connected in series and the new force constant is k'. Then they are connected in parallel and force constant is k". Then k' : k" is :

(1) 1 : 14

(2) 1 : 6

(3) 1 : 9

(4) 1 : 11

Students may find similar question in CP exercise sheet :

[Chapter : S.H.M., Exercise # 3(B), Page No.252, Q.3]

Ans. [4]

Sol. For first part

$$\frac{k_1}{k} = \frac{6\ell}{\ell}$$

$$k_1 = 6k$$

For second part $\frac{k_2}{k} = \frac{6\ell}{2\ell}$

$$k_2 = 3k$$

For third part $\frac{k_3}{k} = \frac{6\ell}{3\ell}$

$$k_3 = 2k$$

When they are connected in series $\frac{1}{k'} = \frac{1}{2k} + \frac{1}{3k} + \frac{1}{6k}$

$$k' = k \quad \dots(i)$$

When they are connected in parallel $k'' = 2k + 3k + 6k = 11k \quad \dots(ii)$

From (i)/(ii) $\frac{k'}{k''} = \frac{k}{11k} = \frac{1}{11}$

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